



## FLOW CALIBRATION

In the photo above, a technician of Moog Inc., East Aurora, New York is using a Microtrak calibrator, a fluid flow measuring device shown in closeup below. Manufactured by Flow Technology, Inc. (FTI), Phoenix, Arizona, the Microtrak system is a commercial offshoot of work performed by FTI for Lewis Research Center. Lewis wanted a system for monitoring the two different



propellants being supplied to a spacecraft rocket thruster. Both propellants were fed to the thruster in very rapid, short duration, simultaneously occurring fluid pulses. The information Lewis sought was not only the flow rate of the propellants but the total fluid supplied in a period of time. FTI had to develop a positive displacement measuring device that could not possibly miss any of the propellant flow, a challenging job that was successfully carried out. The technology thus developed provided a basis for later design of the Microtrak, an extremely precise low-flow calibration system now being marketed worldwide.

One of the primary users is Moog Inc., an international manufacturer of precision controls based on electronic, hydraulic and pneumatic technology. The company's core product is an electrohydraulic servovalve. In this valve, the distance between the flapper and the nozzles is extremely critical and must be precisely established. The only way this can be accomplished is by use of two sapphire orifices, small disc-shaped sapphires with pin-sized holes through their centers; one orifice is used for each nozzle. Moog uses the Microtrak to measure the flow rate, or the speed at which hydraulic oil flows through these tiny holes. Oil is forced through the orifice at different pressure rates and the Microtrak measures the flow rate at various pressure drops. Using this data, two orifices with exactly the same flow rate can be matched as a pair; these matched pairs are then used repeatedly as "masters" in the production of servovalves.

Moog's Microtrak is calibrated with flow rate standards that have been calibrated by the National Bureau of Standards, so it can also be used for calibrating other flowmeter equipment, such as turbines. The turbines, in turn, can be used to measure the flow performance of other Moog products or to calibrate other measurement instruments.